SS100-AJ-MMO-010

REVISION 3

TECHNICAL MANUAL

OPERATION AND MAINTENANCE MANUAL
WITH ILLUSTRATED PARTS BREAKDOWN

ORGANIZATIONAL LEVEL

FIREFIGHTER EXTRACTION SYSTEM (FES)

0910-LP-104-5899

THIS PUBLICATION SUPERSEDES REVISION 2 OF SS100-AJ-MMO-010, DATED 12 OCTOBER 2001.

PUBLISHED BY DIRECTION OF THE COMMANDER, NAVAL SEA SYSTEMS COMMAND

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FOREWORD

This technical manual contains procedures for operation and maintenance of the Firefighter Extraction System (FES). The information in this manual is presented in seven chapters and two appendices, as follows:

- Chapter 1 - Introduction and Safety Precautions
- Chapter 2 - Operation
- Chapter 3 - Functional Description
- Chapter 4 - Scheduled Maintenance
- Chapter 5 - Troubleshooting
- Chapter 6 - Corrective Maintenance
- Chapter 7 - Illustrated Parts Breakdown
- Appendix A - Operational Checklist
- Appendix B - Alternate Rigging

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ABBREVIATIONS AND ACRONYMS

A

APL	Allowance Parts List

C

CAGE	Commercial and Government Entity
CFR	Code of Federal Regulations
COSAL	Coordinated Shipboard Allowance List
COTS	Commercial-Off-The-Shelf

D

DC	Damage Control

F

FEDLOG	Federal Logistics Record
FES	Firefighter Extraction System
FFE	Fire Fighting Ensemble

I

IAW	In Accordance With
IPB	Illustrated Parts Breakdown
ISEA	In-Service Engineering Agent

M

MDS	Maintenance Data System
MIP	Maintenance Index Page
3-M	Maintenance and Material Management
MRC	Maintenance Requirement Card

N

NAVOSH	Navy Occupational Safety and Health
NAVSEA	Naval Sea Systems Command
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
NSDSA	Naval System Data Support Activity

O

OBA	Oxygen Breathing Apparatus
OPNAVINST	Office of the Chief of Naval Operations Instruction
OSHA	Occupational Safety and Health Administration

ABBREVIATIONS AND ACRONYMS (Continued)

P

PMS	Planned Maintenance System

S

SCBA	Self-Contained Breathing Apparatus
SPMIG	Standard PMS Materials Identification Guide

T

TMDER	Technical Manual Deficiency/Evaluation Report

U

USN	United States Navy

SAFETY SUMMARY

1. GENERAL SAFETY NOTICES.

The following general safety notices supplement specific warnings and cautions appearing in this manual. All general safety notices and specific warnings and cautions must be understood and applied during all Firefighter Extraction System (FES) operation and maintenance functions. Should situations arise that are not covered in the general or specific safety precautions, the commanding officer, or other authority, will issue orders as deemed necessary to cover the specific situation. In addition, refer to Office of the Chief of Naval Operations Instruction (OPNAVINST) 5100.19, *Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat, Vol I/II/III* or OPNAVINST 5100.23, *Navy Occupational Safety and Health (NAVOSH) Program Manual* for any situation not covered in the general or specific safety precautions.

2. WARNINGS, CAUTIONS, AND NOTES.

The warnings, cautions, and notes appearing throughout this technical manual must be followed to prevent hazards to personnel and damage to equipment. The following notations define warnings, cautions, and notes as they are used in the text of this manual:

WARNING

Warnings highlight an essential operating or maintenance procedure, practice, condition, or statement, which, if not strictly observed, may result in injury to, or death of, personnel.

CAUTION

Cautions refer to an operating or maintenance procedure, practice, condition, or statement, which, if not strictly observed, may result in damage to, or destruction of, equipment, or loss of mission effectiveness.

NOTE

Notes refer to an operating or maintenance procedure, practice, condition, or statement that is essential, but not of a known hazardous nature.

CHAPTER 1
INTRODUCTION AND SAFETY PRECAUTIONS

1.1 INTRODUCTION.

1.1.1 Purpose. This manual contains technical information necessary to install, operate, troubleshoot, and maintain the Firefighter Extraction System (FES) (Figure 1-1).

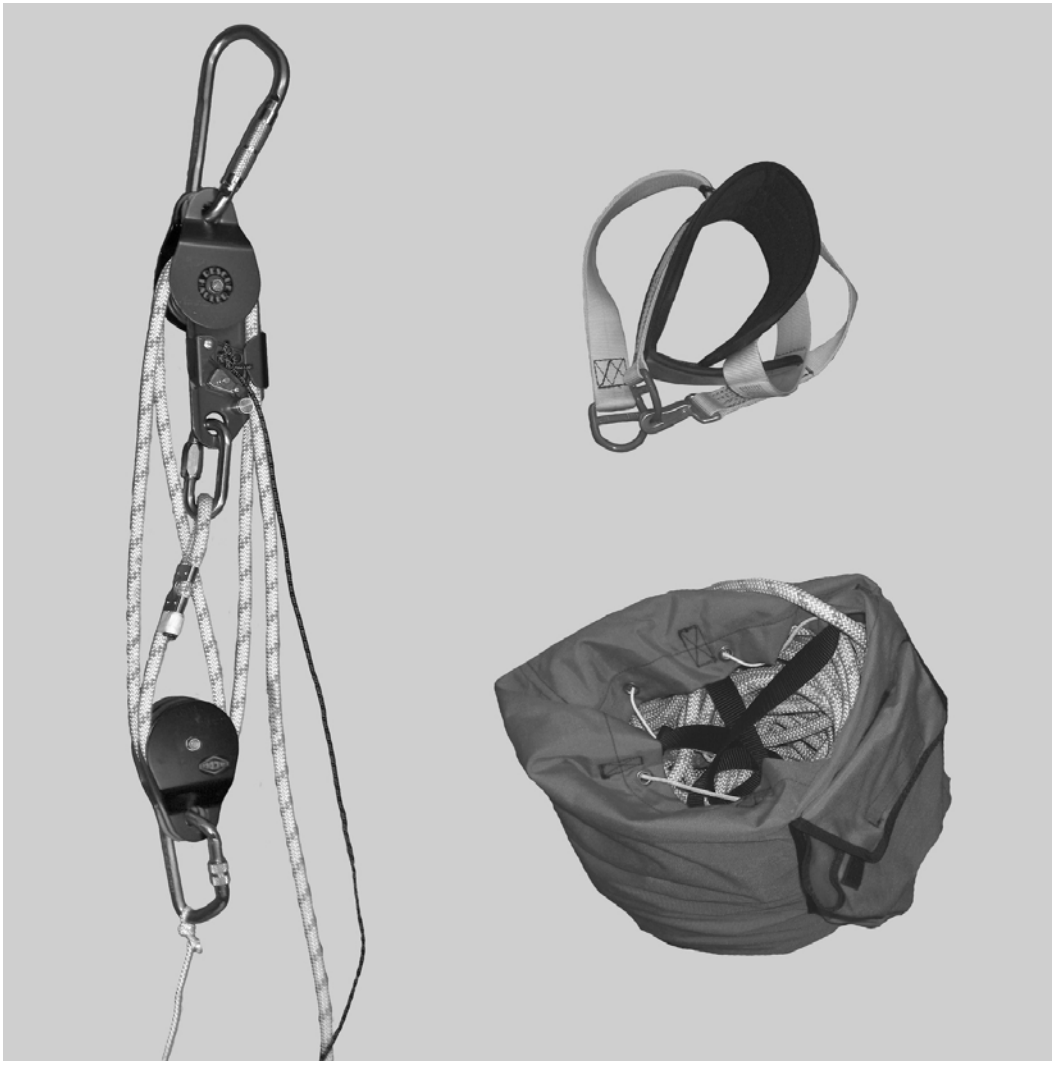


Figure 1-1. Firefighter Extraction System.

1.1.2 Scope. Information contained in this manual is presented as follows:

- Chapter 1, Introduction and Safety Precautions, presents a system description, standards compliance, safety precautions; provides information on equipment and accessories supplied; reference publications not supplied; and itemizes general long-term storage requirements.

- Chapter 2, Operation, provides a description of the components utilized during operation; defines rescue team members and responsibilities; provides operational use and post-operational use procedures.

- Chapter 3, Functional Description, provides a detailed description of the function for each major component of the FES.

- Chapter 4, Scheduled Maintenance, provides information required to perform scheduled and general maintenance procedures.

- Chapter 5, Troubleshooting, provides a table to isolate equipment malfunctions and simple corrective measures to assist in resolving the malfunction.

- Chapter 6, Corrective Maintenance, informs the reader that there are no corrective maintenance procedures for the FES. All required components are replaced at one time. Optional components may be replaced individually.

- Chapter 7, Illustrated Parts Breakdown, provides an Illustrated Parts Breakdown (IPB) for major components of Configurations 1 and 2.

- Appendix A, Operational Checklist, provides reproducible copy of checklist for operating, post-operating, and storage procedures.

- Appendix B, Alternate Rigging, provides procedures for proper rigging when using optional components.

1.2 SYSTEM DESCRIPTION.

The FES provides rescue-lifting capability to remove injured or exhausted firefighters from the bottom of escape trunks during vertical entry firefighting or training exercises. The system consists of commercial-off-the-shelf (COTS) equipment that attaches to an anchorage in the overhead area of the escape trunk and utilizes a rescue sling that allows for extraction of one person at a time. Configuration 1 provides a working range of either 50 or 62.5 feet, while Configuration 2 provides a working range of either 50 or 75 feet.

Individual components may vary slightly between Configurations 1 and 2, but the functionality and operational procedures are identical. The standing block has slight modifications and the longer haul line lengths are different.

1.3 COMPLIANCE.

The FES complies with the following standards:

- *Naval Ships' Technical Manual, Surface Ship Firefighting,* NAVSEA S9086-S3-STM-010, Rev. 11, 01 October 2004, Chapter 555V1, paragraph 555-7.14.7

- National Fire Protection Association (NFPA) 1983, *Fire Service Life Safety Rope, Harness, and Hardware*, 1995 edition.

1.4 SAFETY PRECAUTIONS.

While using the FES, personnel shall comply with the safety instructions listed in paragraph 1.4.2 and with the safety precautions presented in this manual.

Safety precautions must be understood and followed by all personnel during operation and maintenance procedures.

1.4.1 Standard Safety Precautions. The FES shall be used only after personnel have been properly instructed in its use. Use of the FES equipment shall be in accordance with (IAW) posted instructions, labels, and limitations. Personnel must be thoroughly familiar with all safety practices and understand the potential hazards associated with the use and maintenance of the FES equipment.

1.4.2 General Safety Instructions. Standard operational and maintenance safety precautions contained in the following documents apply to the FES:

- Forces afloat must comply with OPNAVINST 5100.19, *Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat, Vol I/II/III*
- Shore activities must comply with OPNAVINST 5100.23, *Navy Occupational Safety and Health (NAVOSH) Program Manual*.

1.4.3 Special Precautions. The warnings, cautions, and notes appearing throughout this technical manual must be followed to prevent hazards to personnel and damage to equipment.

1.5 EQUIPMENT AND ACCESSORIES SUPPLIED.

A list of the equipment and accessories supplied with each Configuration follows:

1. Haul-Safe Kit or Skedco Rescue Kit (refer to Chapter 7 for a list of components)
2. Rescue Sling
3. Anchor Loop, Leading Block, and Self-Locking Carabiner (these items are supplied with each system but their use is optional)

1.6 REFERENCE PUBLICATIONS NOT SUPPLIED.

Table 1-1 lists reference publications not supplied with the FES.

Table 1-1. Reference Publications Not Supplied.

Publication Title	Publication Number	Application
National Institute of Occupational Safety and Health (NIOSH)	42 Code of Federal Regulations (CFR) Part 84	Approval guidelines
Navy Occupational Safety and Health (NAVOSH) Program Manual	OPNAVINST 5100.23	Operation and maintenance safety
Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat, Vol I/II/III	OPNAVINST 5100.19	Operation and maintenance safety
Ships' Maintenance and Material Management (3-M) Manual	OPNAVINST 4790.4 (Series)	Failure analysis reporting
Planned Maintenance System for Firefighter Extraction System (FES)	MIP 6641/022	Preventive maintenance requirements
Naval Ships' Technical Manual, Surface Ship Fighting	NAVSEA S9086-S3-STM-010, Rev. 11, 01 October 2004, Chapter 555V1, paragraph 555-7.14.7	United States Navy (USN) firefighting doctrine

The Naval Sea Systems Command (NAVSEA) Damage Control News website at http://www.dcfp.navy.mil contains information about USN damage control equipment and practices, training tips, and navy messages.

1.7 STORAGE REQUIREMENTS.

FES components must be handled and stored with care. General long-term storage precautions are listed below:

- Avoid storing components in temperatures higher than 120^{o} F (48.8^{o} C) or lower than 0^{o} F (-17^{o} C).
- Do not store components in direct sunlight.
- Ensure components are dry and clean when stored.
- Ensure storage area is well-ventilated.
- Stow in repair locker or IAW ship policy.

CHAPTER 2
OPERATION

2.1 INTRODUCTION.

This chapter contains the following information:

- A description and illustration of the Firefighter Extraction System (FES) (Configurations 1 and 2) components utilized during operation.
- Operational use procedures providing visual inspection, installation for operation, rescuer and victim ascent, and post-operation instructions. A checklist for these procedures is also provided in Appendix A.
- Proper stowage procedures

2.2 COMPONENTS UTILIZED DURING OPERATION.

Table 2-1 presents the nomenclature and function of components utilized during operation. It is important to note that only the look and manufacturer of the equipment differ between Configurations 1 and 2. Figure 2-1 illustrates Configuration 1 components and Figure 2-2 illustrates Configuration 2 components.

The FES is provided to the Fleet with optional components. Table 2-1 itemizes the use of optional components. Figures B-1 and B-2 provide an illustration of the optional components.

- Configuration(s) - identifies the configuration(s) containing the component
- Nomenclature - item name
- Function - provides brief description of function of item

Table 2-1. Components Utilized During Operation.

Configuration(s)	Nomenclature	Function
1 and 2	Anchor Hook	Carabiner that attaches standing block to anchorage
1 and 2	Standing Block	Stationary (upper) pulley through which haul line is threaded
1 and 2	Rope Grab	Allows haul line to move in only one direction
1	Safety Pin	Locks rope grab in safety position
1	Lanyard	Allows personnel to control rope grab in standing block from a remote location
1 and 2	Pull Cord	Allows personnel to control rope grab in standing block from a remote location
1 and 2	Standard Gate Link	Attachment point for swaged end of haul line
1 and 2	Haul Line	Used to lift victim during extraction
1 and 2	Running Block	Pulley lowered to bottom of escape trunk during operation
1 and 2	Self-Locking Carabiner	Attaches haul line to rescue sling during ascent
1 and 2	Rescue Sling	Encircles victim around top of rib cage and under arms during extraction from escape trunk

Table 2-1. Components Utilized During Operation (Continued).

Configuration(s)	Nomenclature	Function
1† and 2	Drop Line	Used to pull rescue sling to bottom of escape trunk and to stabilize rescue sling during victim ascent
1 and 2	Anchor Loop*	Lowers the standing block as needed to provide a clear path for haul line
1 and 2	Leading Block Carabiner*	Locks around ladder rung when leading block is utilized
1 and 2	Leading Block*	Pulley that directs haul line around obstructions

† Refer to Figure 2-2, as Figure 2-1 does not illustrate the drop line
* Indicates optional component

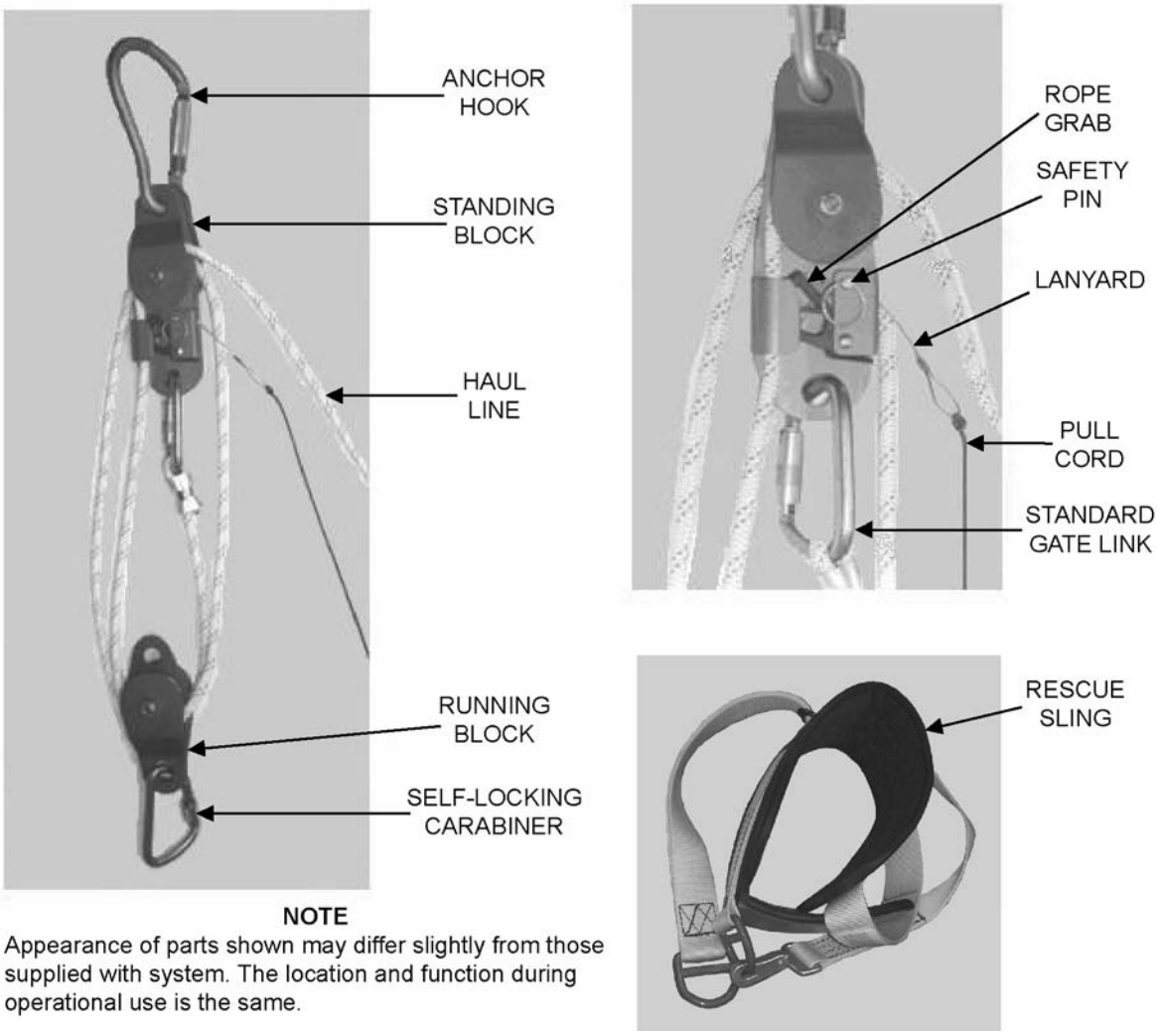
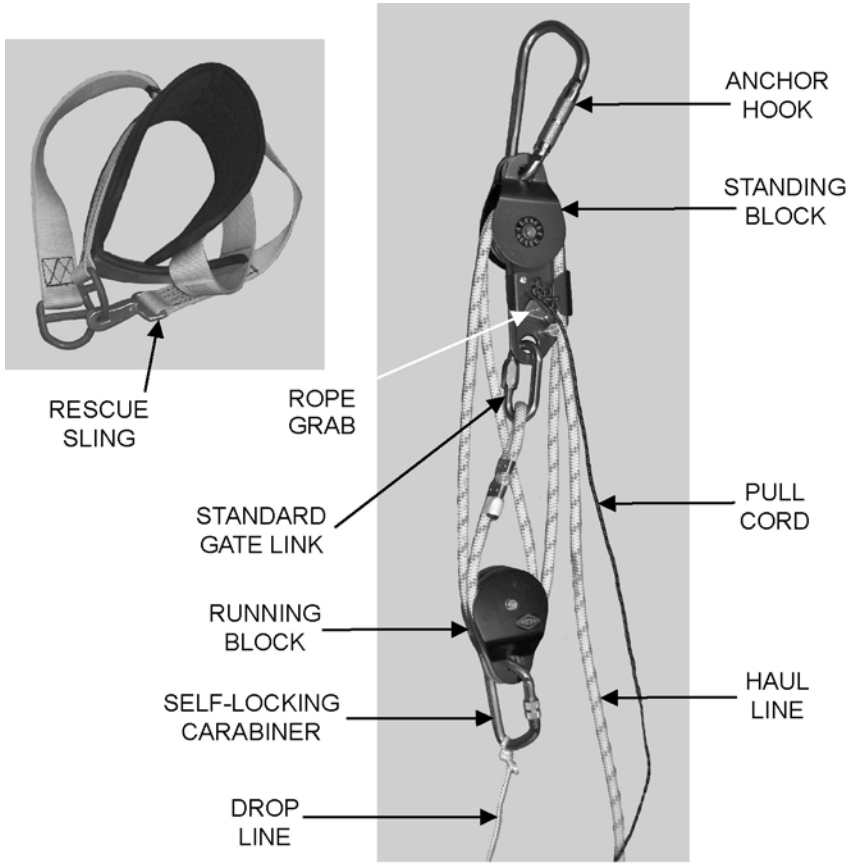


Figure 2-1. Configuration 1 Components.



NOTE
Appearance of parts shown may differ slightly from those supplied with system.
The location and function during operational use is the same.

Figure 2-2. Configuration 2 Components.

2.3 RESCUE TEAM MEMBERS.

Table 2-2 lists the minimum number of positions on a rescue team during operational use. The actual number of rescue team members may differ from those presented due to ship policy or special circumstances encountered during the rescue mission. It is important that all rescue team members understand the function of each position prior to operational use.

Table 2-2. Rescue Team Members.

Number of Personnel*	Position	Function
1	Team Leader	Rescue Team Member responsible for coordination of rescue effort and assigning positions to other rescue team members
1	Rescuer	Firefighter at bottom of escape trunk that pulls rescue sling to bottom of escape trunk and assists victim out of escape trunk
2 - 3	Rescue Team	Rescue Team Members stationed at DC deck level to pull haul line and lift victim out of escape trunk

* This is an estimate. The actual number of rescue team members required to rescue a victim may vary.

2.4 OPERATING PROCEDURES.

Operating procedures providing visual inspection and rigging, and victim extraction instructions are addressed in paragraph 2.4. Appendix A provides a corresponding checklist to be copied and used as needed. Post-operating and stowage procedures are addressed in paragraphs 2.5 and 2.5.1.

2.4.1 Operational Use. The operational use procedures presented contain the position of the rescue team member that is most likely to be responsible for completion of the individual step. When deemed necessary, the team leader may designate responsibility for an individual procedural step to another position.

a. **Team Leader:** Assign positions to rescue team members.

b. **Team Leader:** Ensure FES is positioned at escape trunk.

2.4.1.1 Visual Inspection and Rigging. A quick-check visual inspection is necessary prior to operation. The Operational Checklist (Table A-1) should be completed.

NOTE

Refer to Appendix B when optional components are utilized.

a. **Team Leader:** Designate rescue team member to perform visual inspection as follows:

NOTE

Notify Team Leader of any problems noted while performing visual inspection and rigging procedures.

(1) Inspect haul line (4, Figure 2-3) for fraying, cuts, or other indication of damage.

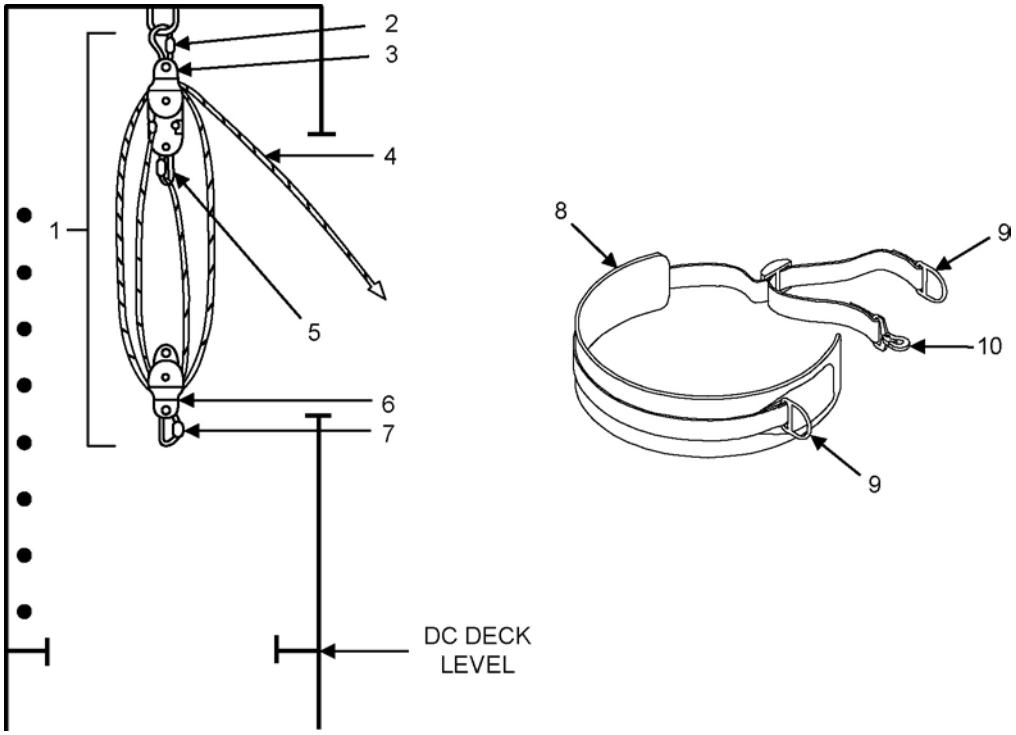


Figure 2-3. Components for Visual Inspection.

(2) Ensure haul line (4, Figure 2-3) is not tangled and block and tackle assembly (1) is properly rigged.

(3) Inspect standing block (3) and running block (6) for deformities, corrosion, or sticking.

(4) Inspect anchor hook (2), standard gate link (5), and self-locking carabiner (7) for deformities or damage.

(5) Inspect rescue sling for damage or deformity to belt (8), snap hook (10), and D-rings (9).

b. **Team Leader:** Designate rescue team member to perform rigging procedures as follows:

(1) Ensure load test label is in place on lifting beam (1, Figure 2-4, Detail A) or pad eye (1, Detail B).

(2) If lifting beam provides anchorage, remove pin, rotate lifting beam to operating position, and reinsert pin. Otherwise, proceed to step (3).

(3) Secure anchor hook (3, Detail A; 2, Detail B) through shackle (2, Detail A) or pad eye (1, Detail B).

(4) Without interfering with personnel traffic, lay haul line (4, Detail A; 3, Detail B) on DC deck.

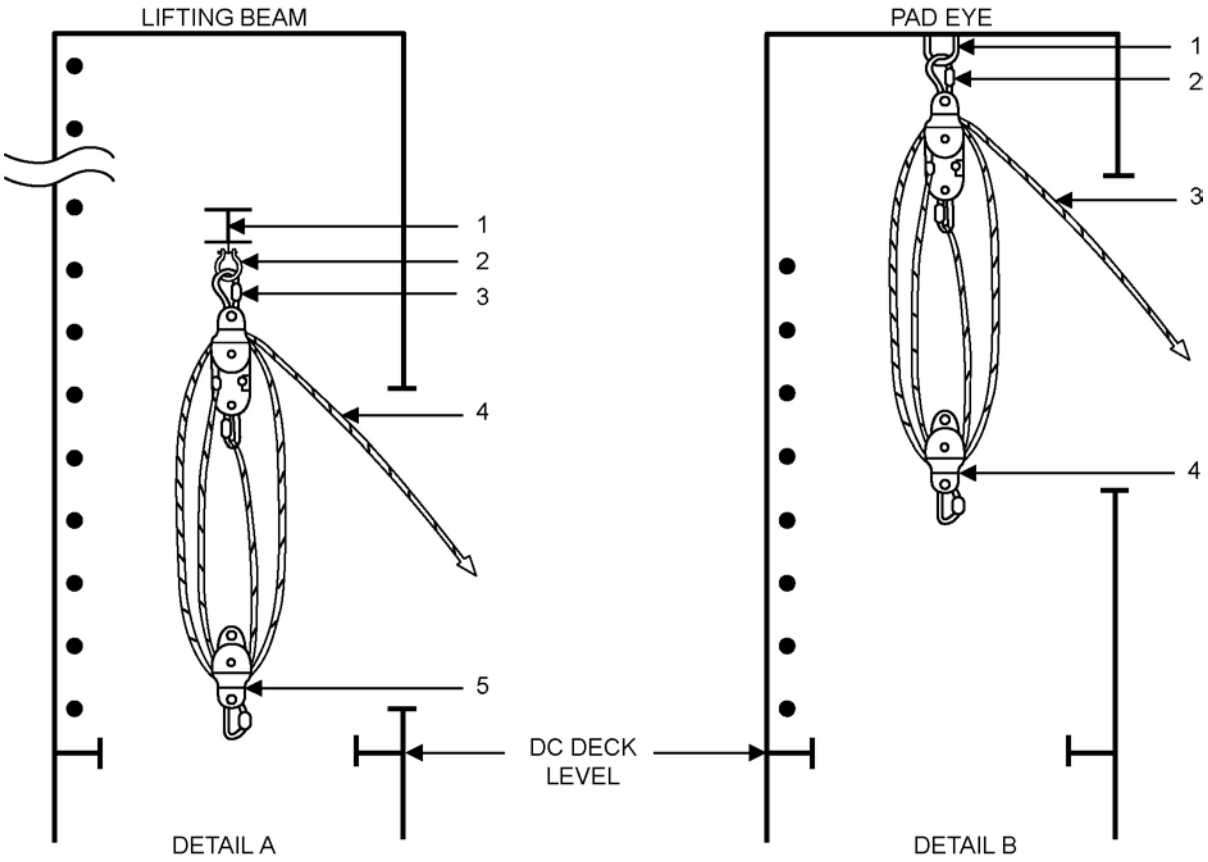
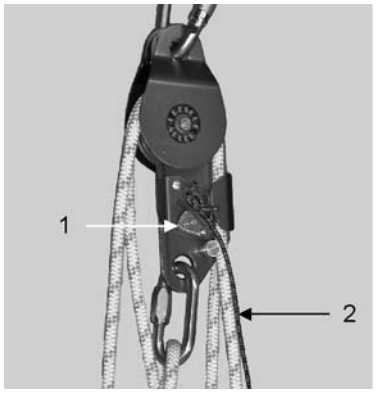


Figure 2-4. Secure Anchor Hook.

(5) Verify rope grab (1, Figure 2-5) is operating properly as follows:



NOTE
Appearance of parts shown may differ slightly from those supplied with system. The location and function during operational use is the same.

Figure 2-5. Verify Rope Grab Operation.

(a) Pull on pull cord (2, Figure 2-5) to release rope grab (1, Figure 2-5) and lower running block (5, Figure 2-4, Detail A; 4, Detail B) to approximately three feet above DC deck level.

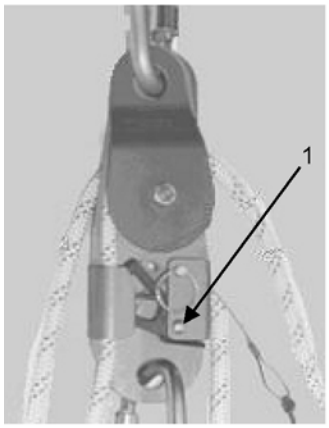
(b) Release pull cord (2, Figure 2-5) to engage rope grab (1, Figure 2-5).

WARNING

Ensure rope grab is engaged. Failure to observe this warning may result in injury or death to personnel.

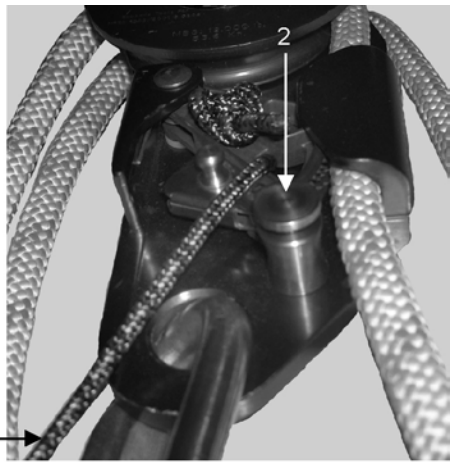
(c) Pull down on running block (5, Figure 2-4, Detail A; 4, Detail B) to ensure rope grab (1, Figure 2-5) is engaged. Running block shall not move.

(d) If running block moves, refer to Figure 2-6. For Configuration 1, reinsert safety pin (1); and for Configuration 2, pull on pull cord (3) to engage rope grab (2) as illustrated.



Configuration 1

NOTE
Appearance of parts shown may differ slightly from those supplied with system. The location and function during operational use is the same.



Configuration 2

Figure 2-6. Rope Grab Engaged.

(6) Stow running block (5, Figure 2-4, Detail A; 4, Detail B) behind ladder rung within reach of DC deck level until needed.

2.4.1.2 Victim Extraction. Appendix A contains an Operational Checklist (Table A-1) and should be completed.

WARNING

Verify proper rigging of the FES. Failure to observe this warning may result in injury or death to personnel.

NOTE

Refer to Appendix B when optional components are utilized.

a. **Team Leader:** Designate another rescue team member to verify proper rigging of FES as follows:

(1) Remove running block from behind ladder rung.

(2) Attach rescue sling to self-locking carabiner.

(3) Verify proper rigging of FES.

b. **Team Leader:** Station two rescue team members at DC deck level to hoist haul line.

c. **Team Leader:** Coordinate victim extraction as follows:

(1) **Rescue Team:** Pull on pull cord to release rope grab. Do not release pull cord until running block is at the bottom of escape trunk.

(2) **Rescuer:** Pull downward on drop line until rescue sling reaches bottom of escape trunk.

(3) **Rescue Team:** Release pull cord to engage rope grab.

(4) **Rescue Team:** While waiting to extract victim from escape trunk, ensure pull cord will not entangle with haul line.

(5) **Rescuer:** Detach rescue sling from self-locking carabiner and secure around victim as follows:

(a) If victim is wearing a Self-Contained Breathing Apparatus (SCBA) (1), slide rescue sling (2) between back of victim and SCBA as shown in Figure 2-7 and proceed to step (6). Otherwise, proceed to step (b).

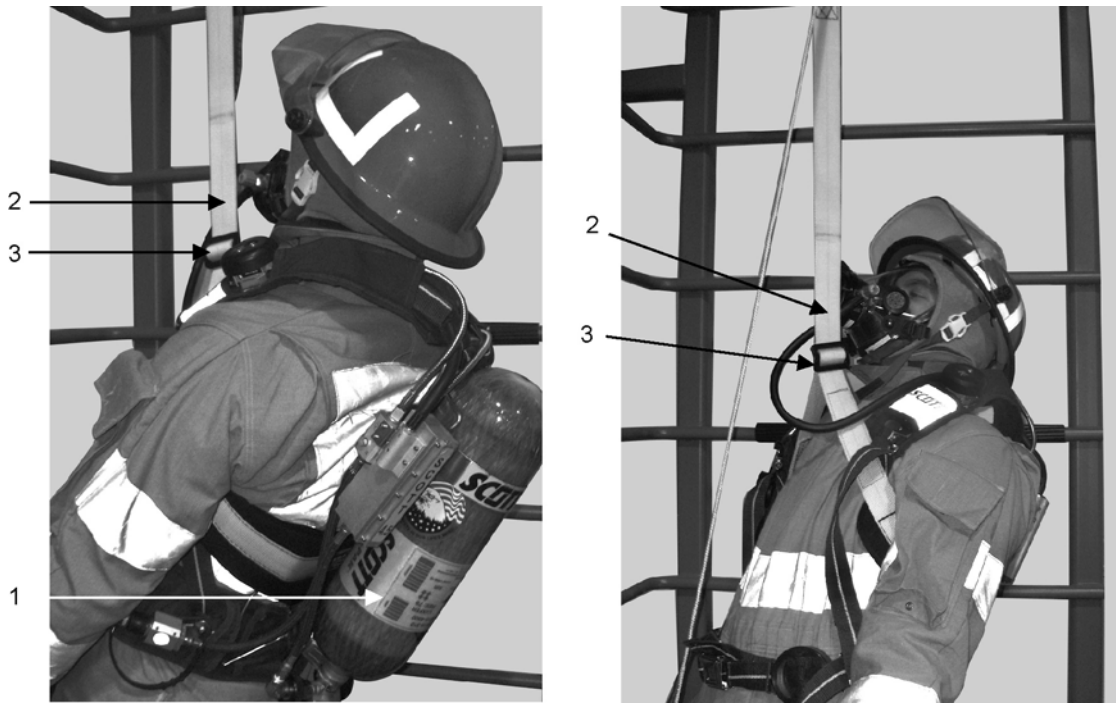


Figure 2-7. Correct Positioning of Rescue Sling with Victim Wearing SCBA.

(b) If victim is wearing an Oxygen Breathing Apparatus (OBA) (1), position rescue sling (2) across back of victim and slide belt straps under arms and OBA frame as shown in Figure 2-8. Proceed to step (6).

Figure 2-8. Correct Positioning of Rescue Sling with Victim Wearing OBA.

(6) **Rescuer**: Adjust friction buckle (3) until belt is snug around chest of victim.

(7) **Rescuer:** Secure running block to D-ring on rescue sling.

(8) **Rescuer:** Ensure victim is in appropriate position for extraction.

(9) **Rescuer:** Signal rescue team to begin pulling on haul line.

(10) **Rescuer:** Grasp drop line to assist in safely guiding victim up escape trunk.

(11) **Rescue Team:** Pull on haul line when signaled by rescuer. Continue pulling haul line while maintaining adequate tension until victim reaches DC deck level and has been assisted out of escape trunk.

(12) **Haul Team:** When rescue team has pulled victim to top of escape trunk, detach self-locking carabiner and remove rescue sling.

d. **Team Leader:** If additional victim(s) require assistance, repeat procedures in step c until all victims have been rescued.

e. **Rescue Team:** Stow running block behind ladder rung until needed.

2.5 POST-OPERATING PROCEDURES.

When all victims have been extracted from the escape trunk or the mission is completed, perform the following post-operating procedures:

NOTE

Refer to Appendix B when optional components are utilized.

a. Remove anchor hook from pad eye or shackle.

b. If applicable, remove shackle.

c. If applicable, remove pin, rotate lifting beam to stored position between ladder rungs, and reinsert pin.

2.5.1 Stowage.

a. Ensure components and shackle are in good repair, clean, and thoroughly dry.

b. Ensure block and tackle assembly is rigged correctly.

c. Place components and shackle in storage bag.

d. Store stowage bag IAW ship policy.

CHAPTER 3
FUNCTIONAL DESCRIPTION

3.1 INTRODUCTION.

This chapter provides a description of the major components of the Firefighter Extraction System (FES). The descriptions are intended to provide personnel with a basic understanding of how each component achieves the desired purpose.

3.2 FUNCTIONAL DESCRIPTION.

The FES provides rescue-lifting capability to remove injured or exhausted firefighters, one at a time, from the bottom of escape trunks during vertical firefighting or training exercises. The FES consists of commercial off-the-shelf (COTS) equipment that attaches to an anchorage in the overhead area of the escape trunk. Configuration 1 provides a working range of either 50 or 62.5 feet, while Configuration 2 provides a working range of either 50 or 75 feet.

Components of the FES are: block and tackle assembly, storage bag, rescue sling, and lifting beam (if escape trunk configuration requires use). Optional components available for Configurations 1 and 2 are: anchor loop, leading block, and leading block carabiner. The functional description of optional equipment is contained in Appendix B of this manual.

3.2.1 Anchorage. The FES utilizes an anchorage installed in the escape trunk prior to operational use and provides a secure attachment point for the anchor hook.

3.2.1.1 Pad Eye. Whenever possible, a pad eye that has been welded into the overhead area of the escape trunk serves as the anchorage for the FES. The pad eye is not considered FES equipment as it is commonly installed in escape trunks.

3.2.1.2 Lifting Beam. If a pad eye is not available, a lifting beam that has been welded to the side of the escape trunk can be utilized. The lifting beam is a non-standard item installed before initial operational use of the FES. A shackle through the lifting beam pad eye provides an anchorage point.

3.2.2 Block and Tackle Assembly. The block and tackle assembly (Figures 3-1 and 3-2) is comprised of the anchor hook, standing block, rope grab, pull cord, standard gate link, haul line, running block, self-locking carabiner, and drop line. Components unique to Configuration 1 are the safety pin and lanyard.

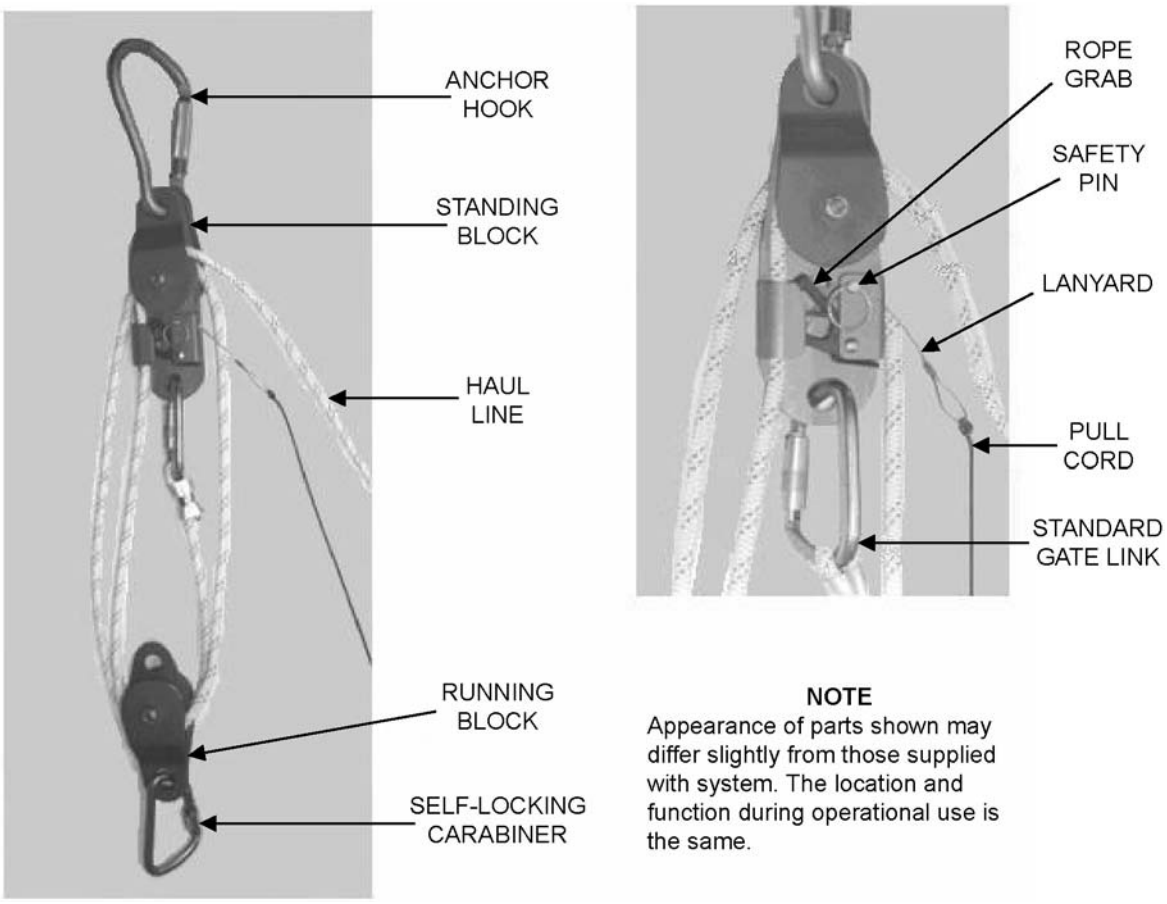


Figure 3-1. Configuration 1 Block and Tackle Assembly.

3.2.2.1 Anchor Hook. The anchor hook is a large, self-locking carabiner that connects the block and tackle assembly to either the pad eye or shackle.

3.2.2.2 Standing Block. The standing block is a corrosion-resistant, double-sheave pulley. The standing block is the upper pulley and remains stationary during operational use.

3.2.2.2.1 Rope Grab. The rope grab is a spring-loaded cam that engages automatically when tension is released on the haul line. This prevents a rescue victim from free-falling down the escape trunk should the haul team lose control of the haul line during operational use. Configuration 1 uses a safety pin (Figure 3-1) to lock the rope grab in the safety position ensuring the haul line will move in only one direction.

3.2.2.2.2 Pull Cord. A pull cord is attached to the rope grab and allows personnel to control the rope grab from a remote location. On Configuration 1 the pull cord is attached to a lanyard (Figure 3-1).

3.2.2.3 Standard Gate Link. The standard gate link is attached to the bottom of the standing block and through the swaged end of the haul line.

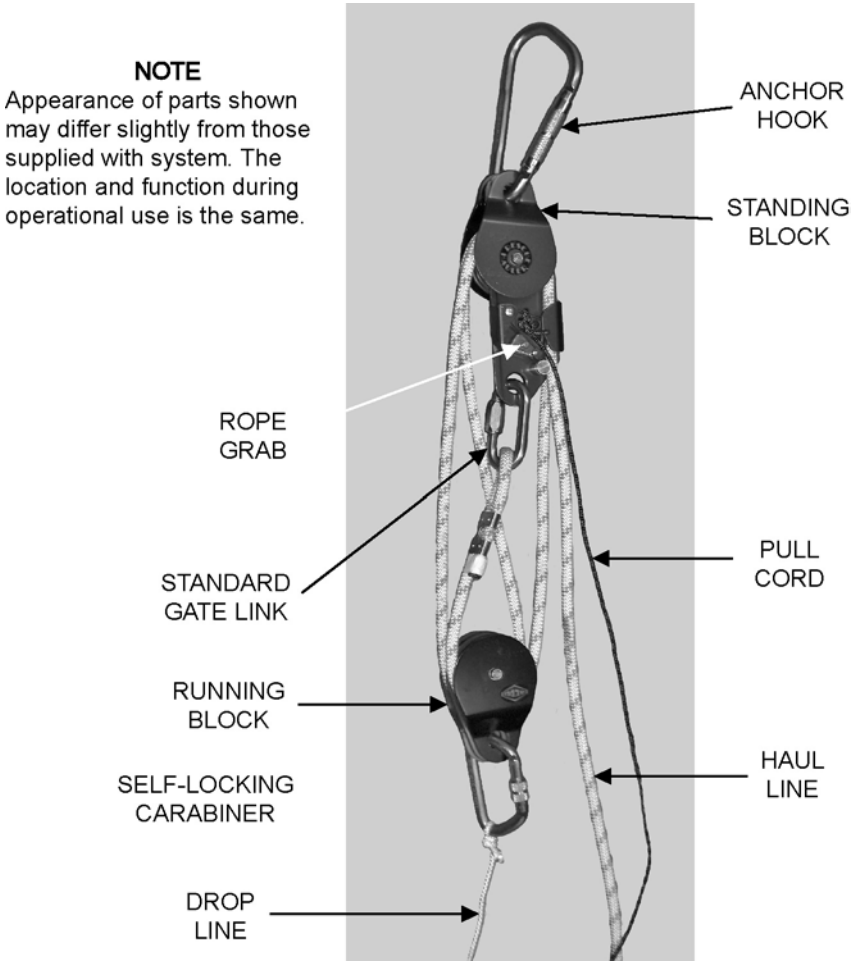


Figure 3-2. Configuration 2 Block and Tackle Assembly.

3.2.2.4 Haul Line. The haul line is a 7/16-inch rescue rope rated for a one-person load. The haul line is rigged through the standing and running blocks in standard configuration for double sheave pulleys.

3.2.2.5 Running Block. The running block is a corrosion-resistant, double-sheave pulley. The running block is the bottom pulley and is lowered to the bottom of the escape trunk during operational use.

3.2.2.6 Self-Locking Carabiner. The self-locking carabiner is attached to the bottom of the running block and to a D-ring on the rescue sling during operational use.

3.2.2.7 Drop Line. The drop line is tied to the self-locking carabiner. During operational use, the drop line allows the rescuer to pull the rescue sling to the bottom of the escape trunk and to guide the victim safely up the escape trunk as the rescue team pulls the haul line. The drop line is used with both Configuration 1 and 2 systems, but is only illustrated in Figure 3-2 in this manual.

3.2.3 Storage Bag. The storage bag (Figure 3-3) is constructed of heavy duty, water-resistant nylon with a drawstring closure, carrying handle, and shoulder strap.

3.2.4 Rescue Sling. The rescue sling (Figure 3-3) is a woven nylon belt with a body pad and snap hook closure. When the rescue sling is properly positioned during operational use, a friction belt ensures a snug fit around the back and upper chest of the victim while being hauled out of the escape trunk.

Figure 3-3. Storage Bag and Rescue Sling.

3.2.5 Optional Components. Each system is initially shipped with optional components which are utilized on an as needed basis. Operational use procedures for these components are provided in Appendix B.

3.2.5.1 Anchor Loop. The anchor loop (Figure 3-4) is used as needed to provide a clear path for the haul line during operational use. The solid-weave, high-strength nylon anchor loop is five feet long with sewn loops at each end. The anchor loop provides an offset of approximately two and a half feet. Red tracers inside the webbing appear when damage (such as cutting) has occurred.

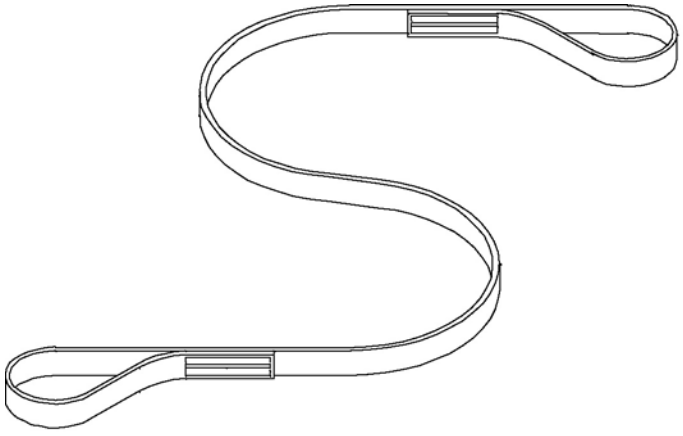


Figure 3-4. Anchor Loop.

3.2.5.2 Leading Block and Leading Block Carabiner. The leading block (Figure 3-5) is used to redirect the haul line around obstructions. Use of the leading block and leading block carabiner increases the effective haul and may require additional personnel on the rescue team. The leading block is a single-sheave pulley attached to a ladder rung or other secure attachment point using the leading block carabiner.

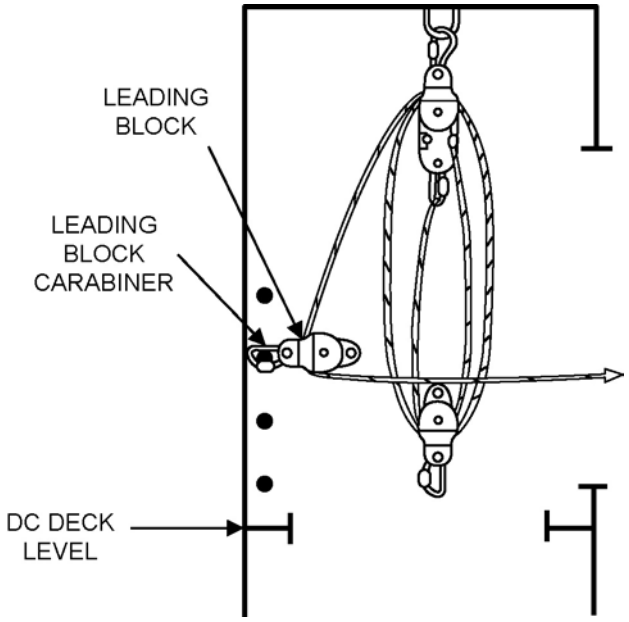


Figure 3-5. Leading Block and Leading Block Carabiner.

CHAPTER 4
SCHEDULED MAINTENANCE

WARNING

Omission or negligent performance of prescribed maintenance procedures for this equipment may result in equipment failure and serious injury or death to personnel.

4.1 INTRODUCTION.

Proper scheduling and performance of preventive maintenance actions reduces equipment failures and ensures sufficient performance of the Firefighter Extraction System (FES). This chapter outlines safety requirements, defines the maintenance concept, references the FES Planned Maintenance System (PMS), discusses reporting requirements, and provides general maintenance instructions relating to both scheduled and unscheduled (corrective) maintenance actions.

4.2 SCOPE.

The preventive maintenance requirements for the FES are addressed in this chapter to assist supervisors and maintenance personnel in planning, scheduling, and documenting maintenance actions. Chapter 4 supplements the FES PMS (paragraph 4.5) and is presented in the following sequence:

- Safety Requirements
- Maintenance Concepts
- PMS
- United States Navy (USN) Maintenance and Material Management (3-M) System Coverage and Problem Reporting
- General Maintenance Instructions

4.3 SAFETY REQUIREMENTS.

Maintenance personnel shall read and thoroughly understand the safety precautions contained in this manual and the Maintenance Requirement Card (MRC) contained in the FES PMS before performing any maintenance on the FES. Forces afloat should comply with Office of Naval Operations Instruction (OPNAVINST) 5100.19, *Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat, Vol I/II/III.* Shore activities should comply with OPNAVINST 5100.23, *Navy Occupational Safety and Health (NAVOSH) Program Manual.*

4.4 MAINTENANCE CONCEPTS.

The FES maintenance concept is based on the USN PMS, which classifies maintenance into two categories - scheduled and unscheduled.

4.4.1 Scheduled Maintenance. Scheduled maintenance primarily includes actions required to ensure reliable system operation and such actions as inspection, cleaning, lubrication, and operational testing. Scheduled maintenance requirements are provided in the FES PMS (refer to paragraph 4.5).

4.4.2 Unscheduled Maintenance. Unscheduled (corrective) maintenance includes actions required to locate equipment faults and to correct failures or performance degradations. Unscheduled maintenance is covered in Chapter 5, Troubleshooting, and in Chapter 6, Corrective Maintenance.

4.5 PLANNED MAINTENANCE SYSTEM.

Table 4-1 lists the MRC that governs the FES PMS. The MRC is indexed and referenced on Maintenance Index Page (MIP) 6641/022, Firefighter Extraction System (FES). MIP 6641/022 provides a summary of the maintenance actions found on the MRC, periodicity codes, personnel requirements, man-hours, and any related maintenance.

Table 4-1. FES Planned Maintenance System.

Periodicity	Maintenance Requirement Card Description
A-1R	Clean and Inspect Lifting Beam
A-2R	Clean and Inspect Block and Tackle Assembly
A-3R	Inspect Rescue Sling

4.6 USN MAINTENANCE AND MATERIAL MANAGEMENT (3-M) SYSTEM COVERAGE AND PROBLEM REPORTING.

The provisions of the OPNAVINST 4790.4 series, *Ships' Maintenance and Material Management (3-M) Manual*, apply to the FES. Accordingly, any problems or need for corrective maintenance arising from performance of the maintenance actions contained in the FES MRC should be properly reported using OPNAV Form 4790/2K to ensure timely and accurate Maintenance Data System (MDS) documentation of FES performance in the Fleet. In addition to Fleet requirements, MDS input from Fleet units is used by the In-Service Engineering Agent (ISEA) to identify and correct problems within the system itself or the related documentation and provisioning, including Coordinated Shipboard Allowance List (COSAL) support. The ISEA may be contacted at Commanding Officer, Naval Surface Warfare Center Panama City, Attn: Code E53, 110 Vernon Avenue, Panama City, FL 32407-7001.

4.7 GENERAL MAINTENANCE INSTRUCTIONS.

WARNING

If in doubt about the serviceability of a part, replace it immediately. Worn or damaged parts shall be replaced with authorized replacement parts only. Component failure during operations may result in serious injury or death to personnel.

4.7.1 Parts Replacement. If any component fails inspection, replace the worn or damaged part with authorized replacement parts only (refer to the Illustrated Parts Breakdown [IPB] in Chapter 7). All the tools, parts, and materials used for maintenance are listed on the MRC.

4.7.2 General Cleaning Procedure. Clean is defined as free of all loose scale, rust, grit, filings, dirt, oil, grease, and other foreign substances when viewed by the unaided eye. Clean FES Components IAW applicable MRCs.

4.7.3 Lubricants. There are no lubrication requirements for the FES.

4.7.4 Inspection.

4.7.4.1 Pre-operational Inspection. Perform a visual inspection of FES components before use as directed in Chapter 2, Operation.

4.7.4.2 Post-operational Inspection. Perform post-operational inspection procedures IAW applicable MRCs.

CHAPTER 5
TROUBLESHOOTING

5.1 INTRODUCTION.

This chapter contains the troubleshooting procedures and data necessary to assist personnel in locating the source of equipment malfunction or performance degradation in the Firefighter Extraction System (FES).

5.2 GENERAL TROUBLESHOOTING INSTRUCTIONS.

Troubleshooting is based on locating potential faults in the equipment and taking timely corrective action. Table 5-1 does not necessarily list all of the malfunctions that may occur, nor all the possible causes for the malfunction that may apply. If a malfunction is not listed or is not remedied by the suggested corrective action(s), notify the supervisor.

Table 5-1. Troubleshooting Guidelines.

Symptom	Possible Cause(s)	Corrective Action(s)
Rope grab release does not engage when haul line is released.	Configuration 1 - Safety pin removed.	Reinsert safety pin.
	Configuration 2 - Rope grab release lever is locked open.	Disengage rope grab release lever.
Haul line does not move through pulleys smoothly.	Dirty or binding pulley.	Clean pulley IAW paragraph 4.7.2.

CHAPTER 6
CORRECTIVE MAINTENANCE

6.1 CORRECTIVE MAINTENANCE INFORMATION.

There are no Firefighter Extraction System (FES) corrective maintenance procedures.

WARNING

If in doubt about the serviceability of a part, replace it immediately. Component failure during operations may result in serious injury or death to personnel.

FES equipment that is damaged or otherwise unsafe for operational use shall be removed from service and replaced in accordance with (IAW) Chapter 7, Illustrated Parts Breakdown.

6.2 TEST EQUIPMENT.

No special test equipment is required for corrective maintenance on the FES.

CHAPTER 7
ILLUSTRATED PARTS BREAKDOWN

7.1 INTRODUCTION.

This chapter provides the Illustrated Parts Breakdown (IPB) for the Firefighter Extraction System (FES). Each component has an exploded view and a corresponding table listing the parts and information necessary for ordering.

7.2 PARTS LISTS AND ILLUSTRATIONS.

Tables 7-1 and 7-2 provide parts lists as shown in Figure 7-1 for FES components. Refer to Allowance Parts List (APL) for ordering information. Table column headings are as follows:

- FIGURE 7-1 ITEM NO.: Indicates the figure and item numbers relating to part location on the corresponding illustration.
- DESCRIPTION: Contains the nomenclature and pertinent descriptive data of the part.
- QTY: Indicates the quantity required per assembly.

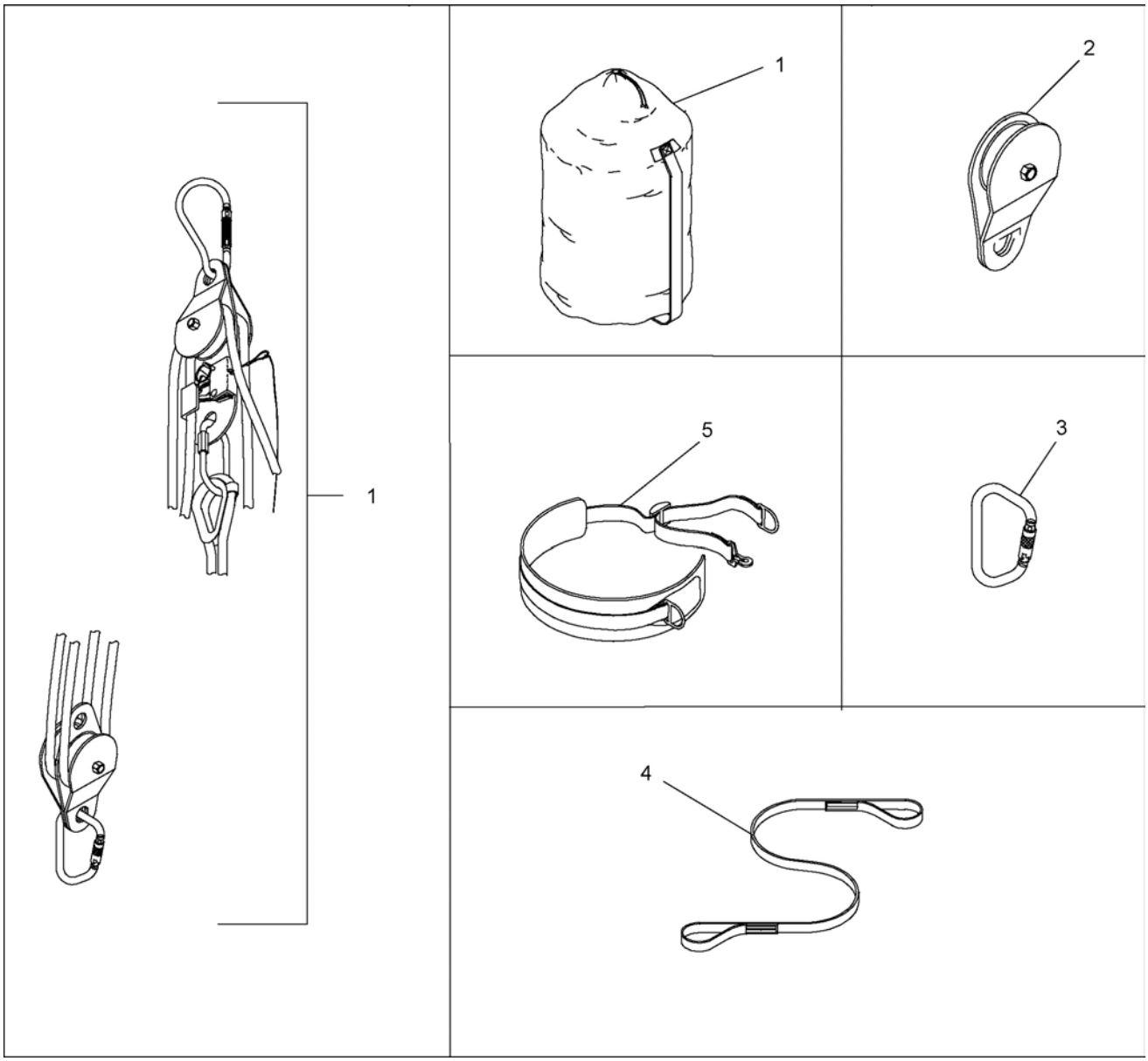


Figure 7-1. Typical Firefighter Extraction System Parts.

Table 7-1. Configuration 1 Firefighter Extraction System Parts List.

FIGURE 7-1 ITEM NO.	DESCRIPTION	QTY
1	Haul-Safe 200 Kit Haul-Safe 250 Kit Contains the following: Anchor Hook Standing Block Pull Cord Standard Gate Link Haul Line Running Block Self-Locking Carabiner Storage Bag	1 1
2	Leading Block	1
3	Leading Block Carabiner	1
4	Anchor Loop	1
5	Rescue Sling	1

Table 7-2. Configuration 2 Firefighter Extraction System Parts List.

FIGURE 7-1 ITEM NO.	DESCRIPTION	QTY
1	Skedco Rescue 50 Kit Skedco Rescue 75 Kit Contains the following: Anchor Hook Standing Block Pull Cord Standard Gate Link Haul Line Running Block Self-Locking Carabiner Storage Bag	1 1
2	Leading Block	1
3	Leading Block Carabiner	1
4	Anchor Loop	1
5	Rescue Sling	1

APPENDIX A
OPERATIONAL CHECKLIST

A.1 INTRODUCTION.

The checklist provided in this appendix should be completed while performing the same procedures in Chapter 2, Operation. Copy and complete the checklist as needed.

A.2 CHECKLIST PROVIDED.

The Operational Checklist is provided in Table A-1 of this appendix and is divided into the following subcategories:

- Visual Inspection and Rigging
- Victim Extraction
- Post-Operating Procedures

Table A-1. Operational Checklist.

FOR DETAILED PROCEDURES, REFER TO PARAGRAPHS 2.4 THROUGH 2.5.1.

PREPARER'S NAME:	**DATE:**

OPERATIONAL USE	
NOTE The operational use procedures presented contain the position of the rescue team member that is most likely to be responsible for completion of the individual step. When deemed necessary, the team leader may designate responsibility for an individual procedural step to another position.	
☐	a. **Team Leader:** Assign positions to rescue team members.
☐	b. **Team Leader:** Ensure FES is positioned at escape trunk.
VISUAL INSPECTION AND RIGGING	
NOTE Refer to Appendix B when optional components are utilized.	
☐	a. **Team Leader:** Designate rescue team member to perform visual inspection as follows:
NOTE Notify Team Leader of any problems noted while performing visual inspection and rigging procedures.	
☐	(1) Inspect haul line for fraying, cuts, or other indication of damage.
☐	(2) Ensure haul line is not tangled and block and tackle assembly is properly rigged.
☐	(3) Inspect standing block and running block for deformities, corrosion, or sticking.
☐	(4) Inspect anchor hook, standard gate link, and self-locking carabiner for deformities or damage.
☐	(5) Inspect rescue sling for damage or deformity to belt, snap hook, and D-rings.
☐	b. **Team Leader:** Designate rescue team member to perform rigging procedures as follows:
☐	(1) Ensure load test label is in place on lifting beam or pad eye.
☐	(2) If lifting beam provides anchorage, remove pin, rotate lifting beam to operating position, and reinsert pin. Otherwise, proceed to step (3).
☐	(3) Secure anchor hook through pad eye or shackle.
☐	(4) Without interfering with personnel traffic, lay haul line on Damage Control (DC) deck.
☐	(5) Verify rope grab is operating properly as follows:
☐	(a) Pull on pull cord to release rope grab and lower running block to approximately three feet above DC deck level.
☐	(b) Release pull cord to engage rope grab.

Table A-1. Operational Checklist (Continued).

FOR DETAILED PROCEDURES, REFER TO PARAGRAPHS 2.4 THROUGH 2.5.1.

PREPARER'S NAME:	**DATE:**

VISUAL INSPECTION AND RIGGING (CONTINUED)	
WARNING **Ensure rope grab is engaged. Failure to observe this warning may result in injury or death to personnel.**	
☐	(c) Pull down on running block to ensure rope grab is engaged. Running block shall not move.
☐	(d) If running block moves, resolve as follows: for Configuration 1, reinsert safety pin; and for Configuration 2, pull on pull cord to engage rope grab. For further clarification, refer to Figure 2-6.
☐	(6) Stow running block behind ladder rung within reach of DC deck level until needed.
VICTIM EXTRACTION	
WARNING **Verify proper rigging of the FES. Failure to observe this warning may result in injury or death to personnel.**	
NOTE Refer to Appendix B when optional components are utilized.	
☐	a. **Team Leader:** Designate rescue team member to verify proper rigging of FES as follows:
☐	(1) Remove running block from behind ladder rung.
☐	(2) Attach rescue sling to self-locking carabiner.
☐	(3) Verify proper rigging of FES.
☐	b. **Team Leader:** Station two rescue team members at DC deck level to hoist haul line.
☐	c. **Team Leader:** Coordinate victim extraction as follows:
☐	(1) **Rescue Team:** Pull on pull cord to release rope grab. Do not release pull cord until running block is at the bottom of escape trunk.
☐	(2) **Rescuer:** Pull downward on drop line until rescue sling reaches bottom of escape trunk.
☐	(3) **Rescue Team:** Release pull cord to engage rope grab.
☐	(4) **Rescue Team:** While waiting to extract victim from escape trunk, ensure pull cord will not entangle with haul line.
☐	(5) **Rescuer:** Detach rescue sling from self-locking carabiner and secure around victim as follows:
☐	(a) If victim is wearing a Self-Contained Breathing Apparatus (SCBA), slide rescue sling between back of victim and SCBA and proceed to step (6). For further clarification, refer to Figure 2-7. Otherwise, proceed to step (b).
☐	(b) If victim is wearing an Oxygen Breathing Apparatus (OBA), position rescue sling across back of victim and slide belt straps under arms and OBA frame and proceed to step (6). For further clarification, refer to Figure 2-8.

Table A-1. Operational Checklist (Continued).

FOR DETAILED PROCEDURES, REFER TO PARAGRAPHS 2.4 THROUGH 2.5.1.

PREPARER'S NAME:	DATE:

VICTIM EXTRACTION (CONTINUED)	
☐	(6) **Rescuer:** Adjust friction buckle until belt is snug around chest of victim.
☐	(7) **Rescuer:** Secure running block to D-ring on rescue sling.
☐	(8) **Rescuer:** Ensure victim is in appropriate position for extraction.
☐	(9) **Rescuer:** Signal rescue team to begin pulling on haul line.
☐	(10) **Rescuer:** Grasp drop line to assist in safely guiding victim up escape trunk.
☐	(11) **Rescue Team:** Pull on haul line when signaled by rescuer. Continue pulling haul line while maintaining adequate tension until victim reaches DC deck level and has been assisted out of escape trunk.
☐	(12) **Haul Team:** When rescue team has pulled victim to top of escape trunk, detach self-locking carabiner and remove rescue sling.
☐	d. **Team Leader:** If additional victim(s) require assistance, repeat procedures in step c until all victims have been rescued.
☐	e. **Rescue Team:** Stow running block behind ladder rung until needed.
POST-OPERATING PROCEDURES	
NOTE Refer to Appendix B when optional components are utilized.	
☐	a. Remove anchor hook from pad eye or shackle.
☐	b. If applicable, remove shackle.
☐	c. If applicable, remove pin, rotate lifting beam to stored position between ladder rungs, and reinsert pin.
STOWAGE	
☐	a. Ensure components and shackle are in good repair, clean, and thoroughly dry.
☐	b. Ensure block and tackle assembly is rigged correctly.
☐	c. Place components and shackle in storage bag.
☐	d. Store stowage bag IAW ship policy.

APPENDIX B
ALTERNATE RIGGING

B.1 INTRODUCTION.

This appendix provides operational use and post-operating procedures with alternate rigging of the FES. Refer to Table 2-1 for information about the components discussed in this appendix. Refer to Chapter 3, Functional Description, for a functional description of the items discussed in this appendix.

B.2 ALTERNATE RIGGING OPERATIONAL USE PROCEDURES.

Optional components may be used together or separately.

B.2.1 Anchor Loop and Leading Block Carabiner.

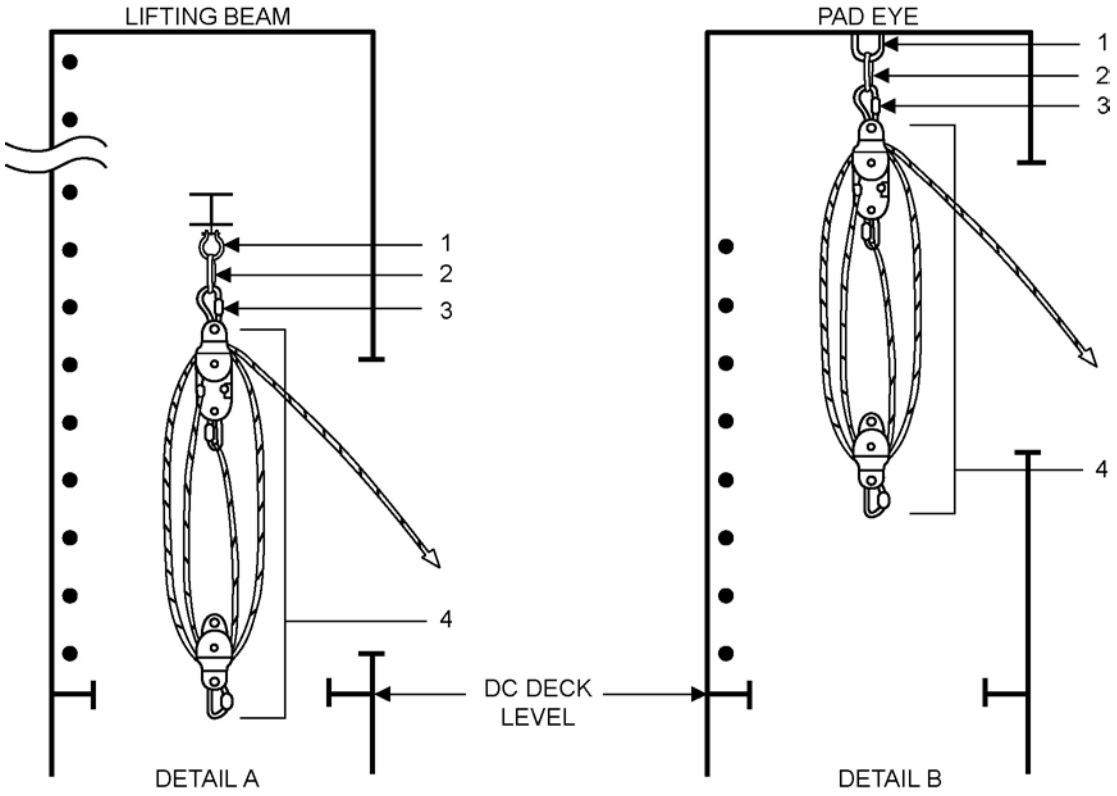
a. Perform operational use procedures in accordance with (IAW) paragraph 2.4.1.

b. Perform Visual Inspection procedures IAW paragraph 2.4.1.1 step a.

c. Ensure load test label is in place on lifting beam or pad eye.

d. If lifting beam provides anchorage, remove pin, rotate lifting beam to operating position, and reinsert pin.

e. Inspect anchor loop (2, Figure B-1) and haul line for fraying, cuts or other indications of damage.



B-1. Alternate Rigging with Anchor Loop.

NOTE

Anchor loop can be doubled before threading through pad eye or shackle. Doing so will result in an offset of approximately 1 1/4 feet.

f. Thread anchor loop (2, Figure B-1) through shackle (1, Detail A) or pad eye (1, Detail B).

g. Secure anchor hook (3) through anchor loop (2) ends to attach block and tackle assembly (4).

h. Inspect leading block (1, Figure B-2) and leading block carabiner (2) for deformities or damage.

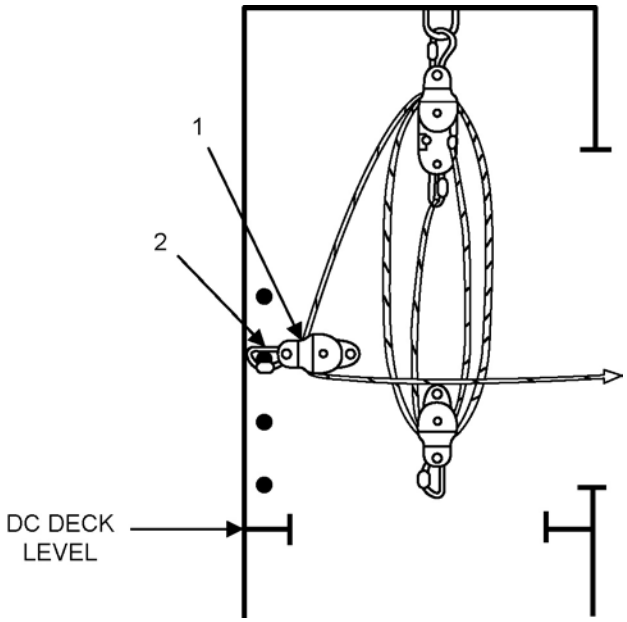


Figure B-2. Alternate Rigging with Leading Block and Leading Block Carabiner.

NOTE

Three rescue team members may be required to pull haul line during victim extraction when the leading block is utilized.

i. Thread free end of haul line through leading block (1, Figure B-2) and secure leading block carabiner (2) to ladder rung in escape trunk within reach of DC deck level as illustrated.

j. Proceed with Visual Inspection and Rigging paragraph 2.4.1.1, step b.(4) and remaining operational use procedures.

B.3 POST-OPERATING PROCEDURES.

a. Remove leading block and leading block carabiner from ladder rung.

b. Remove anchor hook from anchor loop.

c. Remove anchor loop from pad eye or shackle.

d. If applicable, remove pin, rotate lifting beam to stored position between ladder rungs and reinsert pin.

e. Perform stowage procedures IAW paragraph 2.5.1.